

## COMMONWEALTH OF MASSACHUSETTS

MIDDLESEX, ss.

SUPERIOR COURT DEPARTMENT  
OF THE TRIAL COURT  
CIVIL ACTION NO. 95-7378

COMMONWEALTH OF MASSACHUSETTS,

Plaintiff,

v.

PHILIP MORRIS INCORPORATED,  
R.J. REYNOLDS TOBACCO COMPANY,  
BROWN & WILLIAMSON TOBACCO CORPORATION,  
B.A.T INDUSTRIES P.L.C.,  
LORILLARD TOBACCO COMPANY,  
NEW ENGLAND WHOLESALE TOBACCO CO., INC.,  
ALBERT H. NOTINI & SONS, INC.,  
THE COUNCIL FOR TOBACCO RESEARCH-U.S.A., INC. and  
THE TOBACCO INSTITUTE, INC.,

Defendants.

AFFIDAVIT OF PAUL SLOVIC, Ph.D.

I. Paul Slovic, depose and state under oath as follows:

1. I have a bachelors degree in Psychology from Stanford University and Masters and Ph.D. degrees in Psychology from the University of Michigan. I am currently Professor of Psychology at the University of Oregon and President of Decision Research, a nonprofit research institute specializing in the study of human judgment, decision making, and risk assessment. I have been conducting research on human behavior in situations of risk for almost 40 years. I was one of the first social scientists to study people's perceptions of risk and I have written numerous articles based on my research in this area. I was elected President of the Society for Risk Analysis in 1983 (the

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first social scientist to serve as president of that society) and, in 1991, I received the distinguished Contribution Award from the Society for my research on risk perception. In 1993, I was selected by the American Psychological Association as the recipient of the Association's Distinguished Scientific Contribution Award. In 1995, I received the Outstanding Contribution to Science Award from the Oregon Academy of Science. I serve on the editorial boards of numerous journals and have been a member of a number of committees of the National Research Council/National Academy of Sciences dealing with issues of risk assessment, including the committee that produced the 1983 report titled "Risk Assessment in the Federal Government: Managing the Process" (National Academy of Sciences, 1983). I was also a member of the National Academy of Sciences Committee on Risk Characterization that recently produced a report titled "Understanding Risk: Informing Decisions in Democratic Society" (National Academy of Sciences, 1996). I am a member of the National Council on Radiation Protection and Measurements and have served on the Council's Board of Directors. My fields of specialization are judgment, decision making, risk perception, and risk assessment. I have published extensively in these areas. A copy of my recent article, "What Does It Mean to Know a Cumulative Risk? Adolescents' perceptions of short-term and long-term consequences of smoking," is attached hereto as Exhibit A. My opinions herein are based upon my knowledge, education and experience, including my research.

2. It is my opinion that individuals do not fully understand and appreciate the risks that smoking entails. This misappreciation is particularly important with respect to young persons, because most smokers start to smoke during childhood and adolescence.

the risks of smoking. Professor Viscusi further opines that these results support a model in which smokers are making an informed, rational choice to smoke. Professor Viscusi's data are invalid and his opinions erroneous.

4. One of the critical flaws in Professor Viscusi's analysis is his failure to appreciate the dynamics of risk perception in the context of a cumulative risk, such as smoking. Cigarette smoking is a behavior that takes place one cigarette at a time. A person smoking one pack of cigarettes every day for 40 years smokes about 300,000 cigarettes. Although Professor Viscusi ignores it, research suggests that people are more willing to expose themselves to risk from a chemical carcinogen described as cumulative ("the poison builds up in your body" as with cigarette smoking) than to take a statistically equivalent risk described as a series of independent exposures ("the poison does not build up -- if a dose does not make you sick it will pass right through you without doing any harm"). People in the cumulative hazard ("smoking") condition tend to believe that risking exposure a few times would be safe. This tendency was less apparent among people in the independent exposure condition, despite the fact that both groups were told the first five exposures would make the risk of succumbing to the toxin equal to 50%. In contrast to that "conducted" by Professor Viscusi, my survey research finds that young smokers, as cumulative risk takers, believe they can get away with some amount of smoking before the risk takes hold. In short, many young smokers tend to believe that smoking the "very next cigarette" poses little or no risk to their health or that smoking for only a few years poses negligible risk. Young smokers thus tend to believe in the safety

3. In contrast, cigarette industry expert Professor Viscusi opines that virtually everyone knows that smoking is hazardous to one's health and, in fact, they overestimate

of short-term smoking.

5. Young smokers tend to underestimate the risk of becoming addicted to cigarette smoking. They come to regret ever having begun to smoke and attempt to quit, often unsuccessfully. Belief in the short-term safety of smoking combines insidiously with this tendency to underestimate the difficulty of stopping smoking. As a result, many young smokers perceive themselves to be at little or no risk from smoking because they expect to stop before any damage to their health occurs. In actuality, a high percentage of smokers continue to smoke over a long period of time and are certainly placed at risk by their behavior. By failing to appreciate the severe and cumulative consequences of an addictive behavior, these people can be said to seriously underestimate the risks from smoking.

6. Smokers' underestimation and denial of their risks is further enhanced by a widespread phenomenon called "optimism bias." Scores of studies conducted over the past two decades have found that people consistently assert that their personal risk from some activity or hazard is less than the risk faced by others. Optimism bias has been found to be greatest for hazards felt to be controllable by personal action, such as lifestyle risks. Optimism bias is also greater when people believe that signs of vulnerability will appear early, such that an absence of present, visible signs means they are exempt from future harm. It is not surprising, then, that strong optimism bias and its attendant underestimation of smoking risks have been found in cigarette smokers.

7. Appreciating the risk of smoking means appreciating the nature of the consequences as well as the probabilities of those consequences. I have seen no evidence to show that teenagers, or others who initiate smoking, have realistic knowledge of what

it is like for a smoker to experience lung cancer, chronic obstructive pulmonary disease, congestive heart failure, or any other of the fates awaiting smokers that many would consider "worse than death." The difficulty of appreciating the unfamiliar consequences of one's decisions has long been recognized. The fact that the most serious harmful consequences of smoking occur in the distant future also makes it unlikely that concerns about these consequences will influence the decisions made by teenagers (those most likely to initiate smoking).

8. Professor Viscusi's risk analysis also suffers from its complete reliance on quantitative perceptions of risk. The vast majority of risk decisions are, however, motivated by affect rather than analysis of quantitative statistical facts. Affect is a subtle form of emotion, defined by positive (like) or negative (dislike) evaluative feelings toward an external stimulus (such as a cigarette, or the act of smoking, or images of cigarettes and smoking). Such evaluations occur rapidly and automatically. Although deliberative analysis is certainly important in some decision-making circumstances, reliance on affect and emotion is a quicker and easier way to navigate in a complex, uncertain, and sometimes dangerous world and is widely employed. Marketing and advertising specialists have long assumed the power of affect in decision-making. Affect forms the basis of a wide variety of cigarette advertising and other promotions designed to associate positive imagery and affect with the act of smoking. In addition to advertising and marketing manipulations of imagery and affect, the affective cues emanating from the social environment are also powerful influences on smoking behavior. Having a good time with friends and avoiding the risk of peer disapproval are examples of social factors in which affect likely dominates any tendency for analytic or

deliberative thinking.

9. Reliance on affect has been found to underlie the inverse relationship between perceived risk and perceived benefit. Thus the more attractive a product or activity becomes, the more its perceived risks decline. Thus cigarette advertising and other promotional efforts (e.g., attractive packaging, gifts to consumers) designed to increase the positive affect associated with smoking, would likely reduce perceptions of risk. Of course, pleasurable experiences associated with smoking (e.g., good taste, relaxation, social facilitation) would also be expected to reduce perceived risk.

10. The points noted above demonstrate the fallacy of Professor Viscusi's arguments that all people, and particularly younger individuals, overestimate the risks from smoking. First, he neglects to take into account or test for the effects of optimism bias, a phenomenon that has been the subject of more than 250 scientific papers during the past several decades. The research questions he relies upon ask about risks to other people, hence the answers likely do not represent the perceived risk to the smoker himself or herself. Second, he fails to demonstrate that smokers appreciate the unpleasant, debilitating consequences of smoking-induced morbidity. Third, he fails to demonstrate that smokers appreciate the cumulative nature of smoking risks and the power of addiction that makes it extraordinarily difficult for them to stop smoking when they decide to do so. Fourth, he fails to demonstrate that statistics about smoking risk are motivating to adolescents whose behaviors are likely to be driven by impulse and affect.

11. Equally serious is the fact that the quantitative estimates of risk that Professor Viscusi relies upon for his conclusions are so highly determined by methodological biases as to be completely untrustworthy. The high perceived

probabilities of smoking-induced lung cancer that his respondents generate are due to the fact that lung cancer (or a combination including mortality from "lung cancer, heart disease, throat cancer, and all other illnesses") is the only outcome for which probabilities are elicited. Focusing only on one target consequence or one set of consequences is known to make that consequence seem more probable. Moreover, when the same person judges lung cancer alone and then judges lung cancer in conjunction with a number of other causes of death whose relative frequencies also have to be estimated, the estimated frequency of lung cancer drops precipitously. It is no longer overestimated and the correlation (i.e., the reliability coefficient) between the judgment of lung cancer alone and the judgment of lung cancer in the context of other causes of death is close to zero. One can get almost any estimate one wishes for lung cancer, simply by varying the number of other causes of death that also have to be estimated. The loss of life expectancy question used by Professor Viscusi is prone to similar problems and suffers from similar manipulability.

12. Consumers have been provided mixed messages about the risk from smoking. Government messages have emphasized the seriousness of these risks. Industry messages have, in the past, played down the risks. From the research conducted by Professor Viscusi, one might be tempted to conclude that people will give inordinate weight to the high-risk or "worst-case" estimate. There is good reason to believe that this argument is incorrect. Research indicates that divergent information tends to be interpreted and used in a way that is consistent with the person's basic motivation to choose or reject the product. Thus, when faced with conflicting information about the risks from smoking one would expect that persons who wish to smoke would tend to go



with the low-risk estimate -- consistent with their desire to smoke and their wish to believe that smoking is not dangerous.

13. Based upon my assumption that the finder of fact concludes that the industry (i) fostered a public message of doubt and controversy regarding the health effects of cigarette smoking, (ii) did not disclose or acknowledge to the public the addictiveness or dependence-inducing nature of nicotine use through cigarette smoking, (iii) used health imagery through its advertising and marketing programs, (iv) used youthful, sexual, or other attractive imagery for its cigarette products, and (v) fostered a political and social culture of acceptance or tolerance for cigarette smoking, I am of the opinion to a reasonable degree of certainty in the behavioral science of risk perception that the actions of the United States cigarette industry substantially contributed to the historic fact of the significant underappreciation and personal denial of the significant health risks and addictiveness of cigarette smokers of all stages (initiation, maintenance, and attempted cessation), and that, as a result, the actions of the United States cigarette industry substantially contributed to the widespread persistence of the smoking of

conventional cigarette products in the United States including that portion of the population that would, over the years, ultimately receive Medicaid assistance for smoking-attributable diseases.

SIGNED under the pains and penalties of perjury this 29 day of October, 1998.



Paul Slovic

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